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October 3, 2001

Ms. Magalie Salas, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: ET Docket No. 98-153, Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems
Ex parte Communication

On behalf of Peter Annan, President, Sensors & Software Inc., and as an accommodation to Alan Schutz, Engineering Manager, Geophysical Surveys Systems, Inc., and David Wright, Research Geophysicist, U.S. Geological Survey, and pursuant to Section 1.1206(b)(2) of the Commission's Rules, I am electronically filing this notice of an oral *ex parte* communication for inclusion in the above-referenced docket.

Yesterday Messrs. Annan, Schutz, Wright, and I met with Julius P. Knapp, Karen Rackley, John A. Reed, Lisa Gaisford, and Ron Chase of the Commission staff. Participating by videoconference were David L. Means, Richard Fabina, and Ray LaForge.

We discussed points previously raised in the proceeding and outlined in the attached presentation.

If there are any questions about this filing, please call me at the number above.

Respectfully submitted,

Mitchell Lazarus
Counsel for Sensors & Software Inc.,
and filing as an accommodation to
Alan Schutz and David Wright

cc: Meeting Participants

Recommendations for Regulation of GPR Devices Under Part 15

Annan, Olhoeft, Schutz, Wright

ET Docket No. 98-153

Who we are

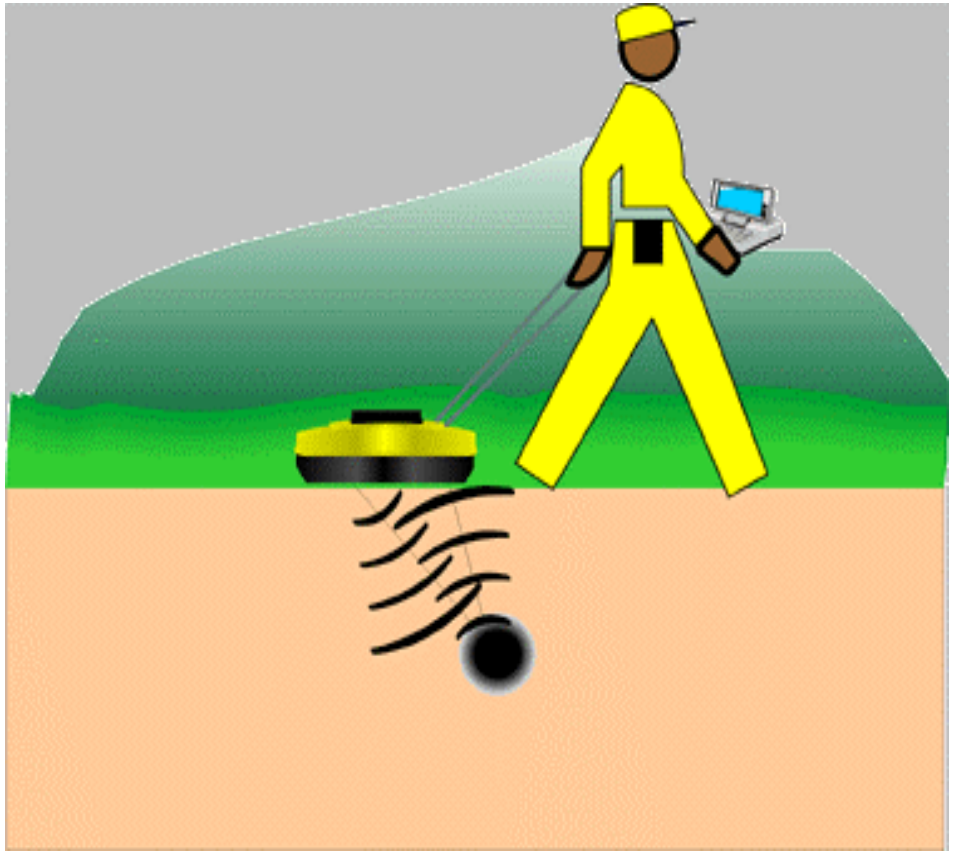
- Annan, - President of Sensors & Software Inc.
- Olhoeft - Professor of Geophysics,Colorado School of Mines
- Schutz - Engineering manager, Geophysical Surveys Systems, Inc.
- Wright - Research Geophysicist, U.S. Geological Survey

  - **recognized leaders in GPR**
  - **represent industry, government and university**
  - **each has more than 25 years experience in the field**
  - **companies represent >90% of units in USA**

Presentation Summary

- requests for rule making regarding GPR
- explain GPR and illustrate some uses
- provide rationale for requests

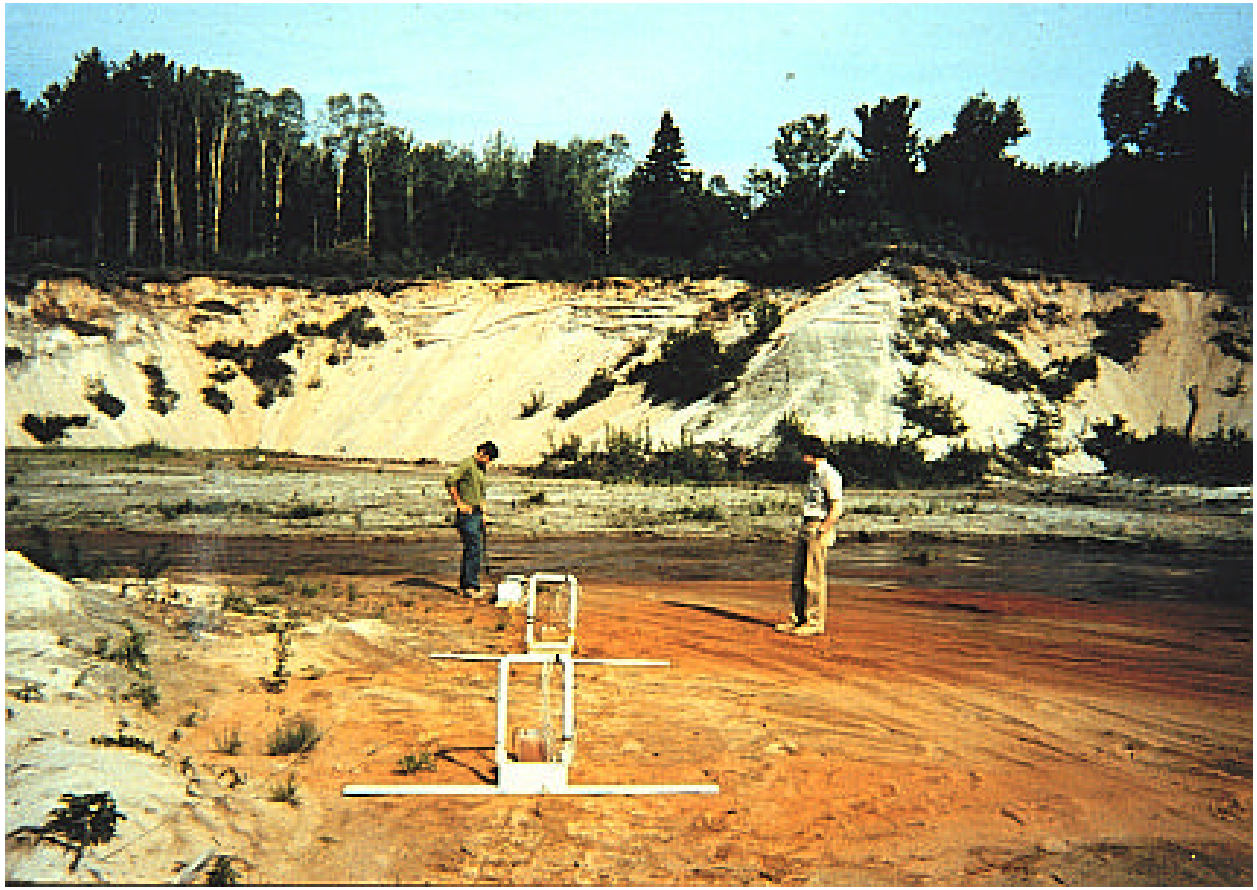
GPR Images the Subsurface



- acronym for **G**round **P**enetrating **R**adar
- ground can be soil, rock, concrete, wood - anything non-metallic
- emits a EM pulse into the ground
- records echoes
- builds an image from the echoes

12 MHz GPR System in Operation at a Nickel Mine for Open Stope Detection - Mine Safety

50 MHz GPR profiling across groundwater contaminant plume



100 MHz GPR used in a mine looking for roof hazards

250 MHz GPR for environmental site assessment-UST location

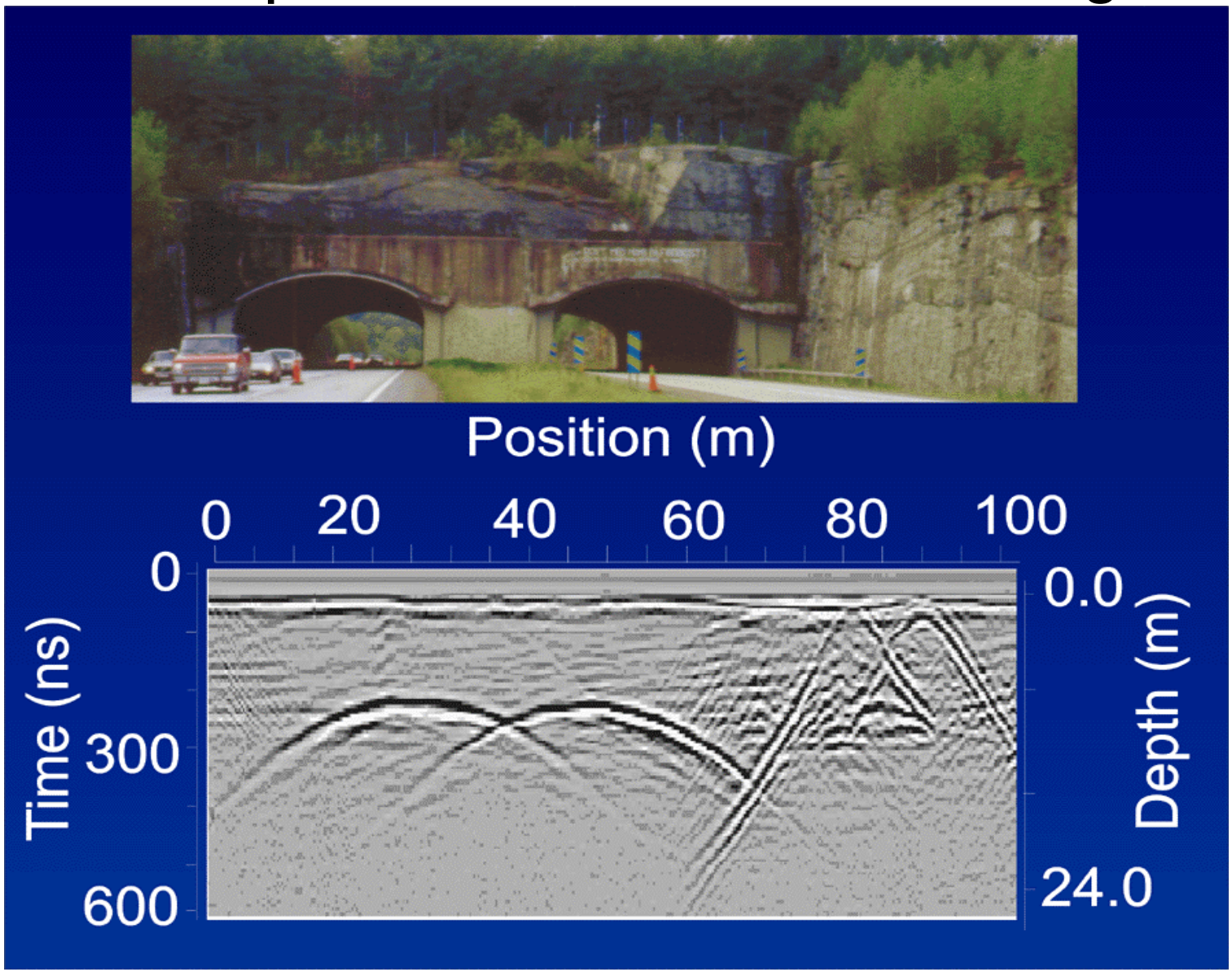
500 MHz GPR system with GPS positioning for snow and avalanche evaluation

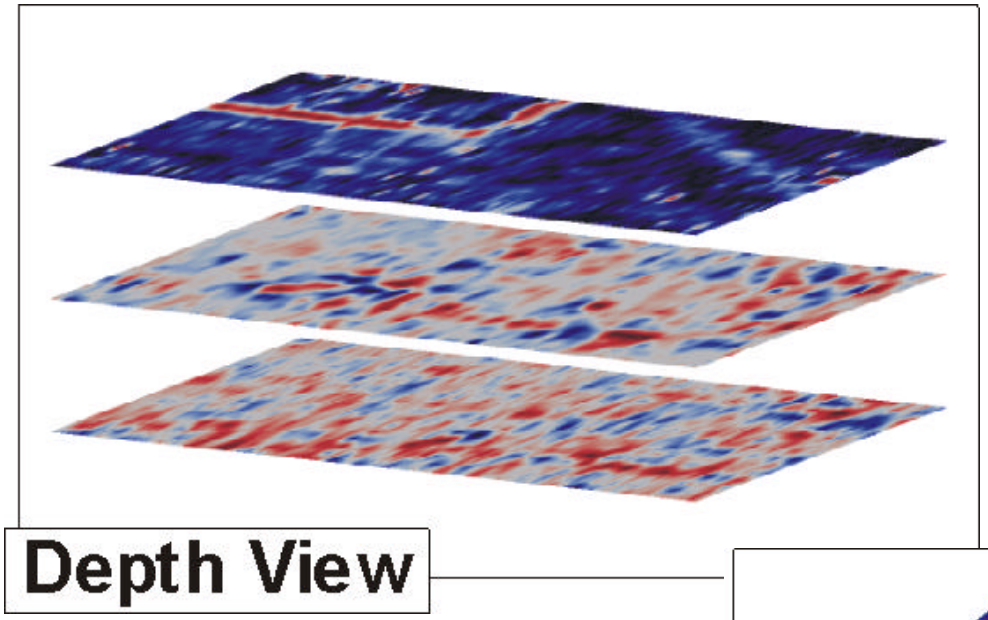
400 MHz Utility Mapping GPR with GPS Positioning

1500 MHz Concrete Inspection GPR

100 MHz borehole GPR being lowered into water quality monitoring well

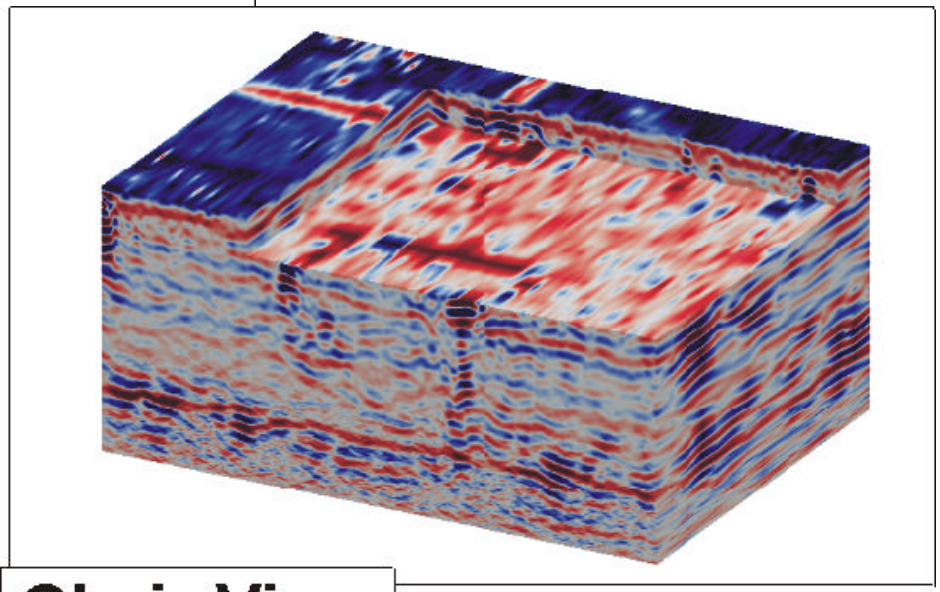
Example GPR cross section image





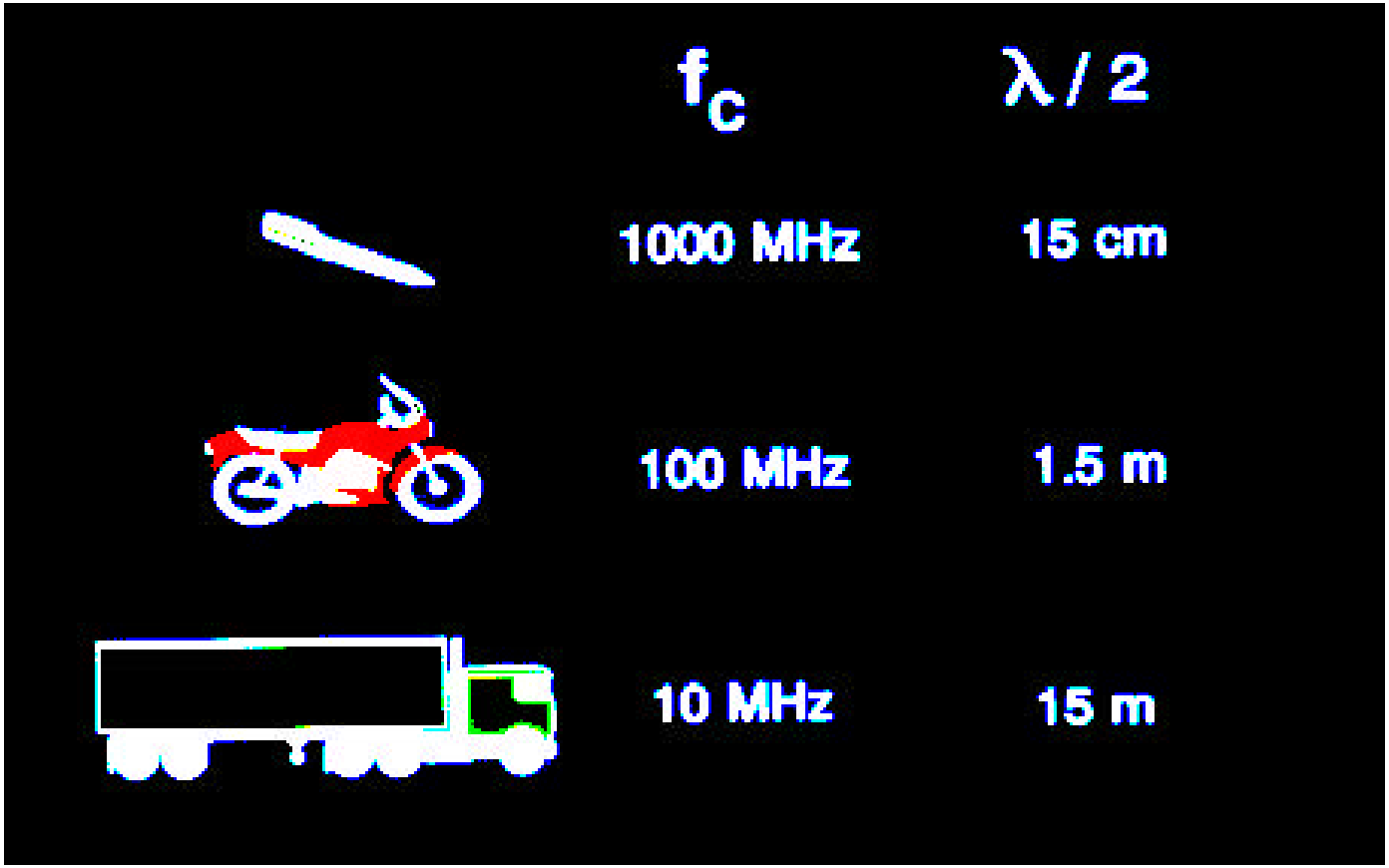
Depth View

Modern GPR images like X-ray cat scans and MRI

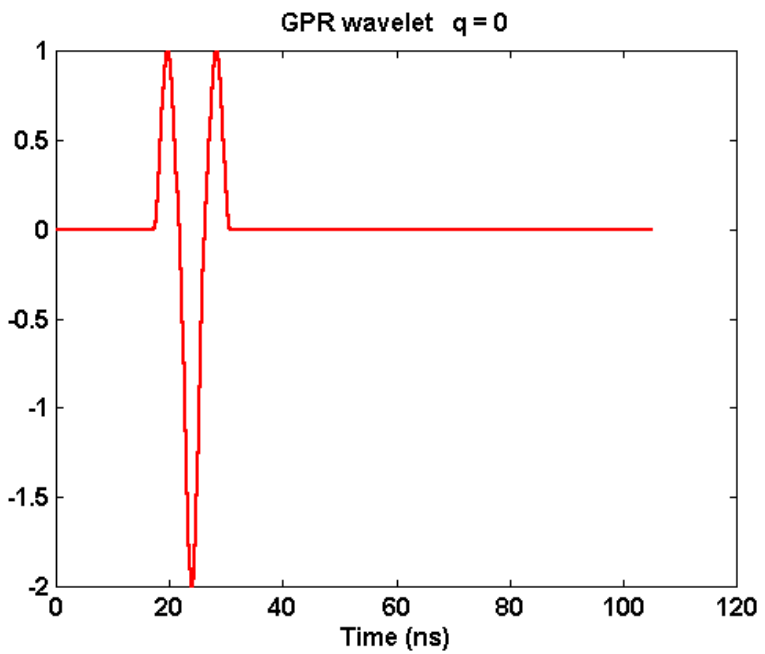


Chair View

GPR center frequency is tailored to application scale

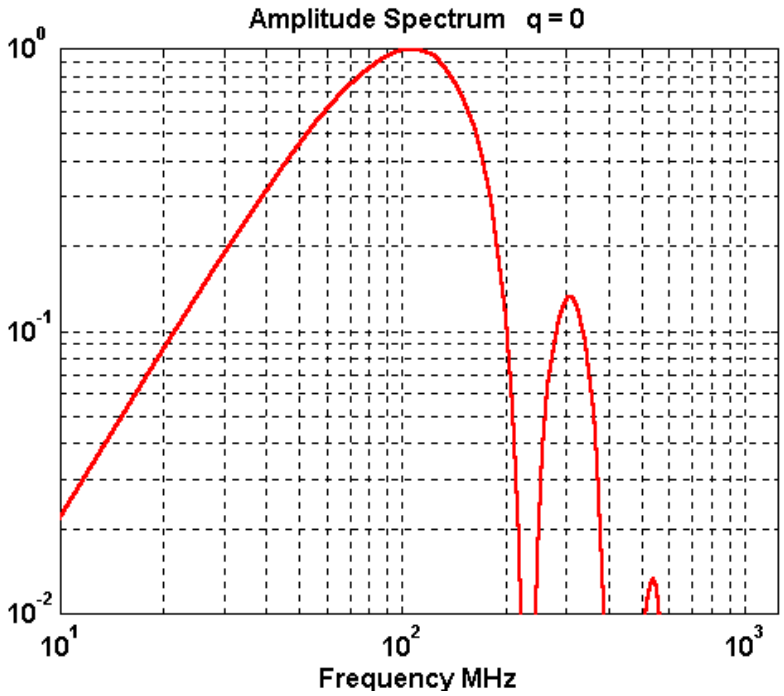


Short dipole impulse response

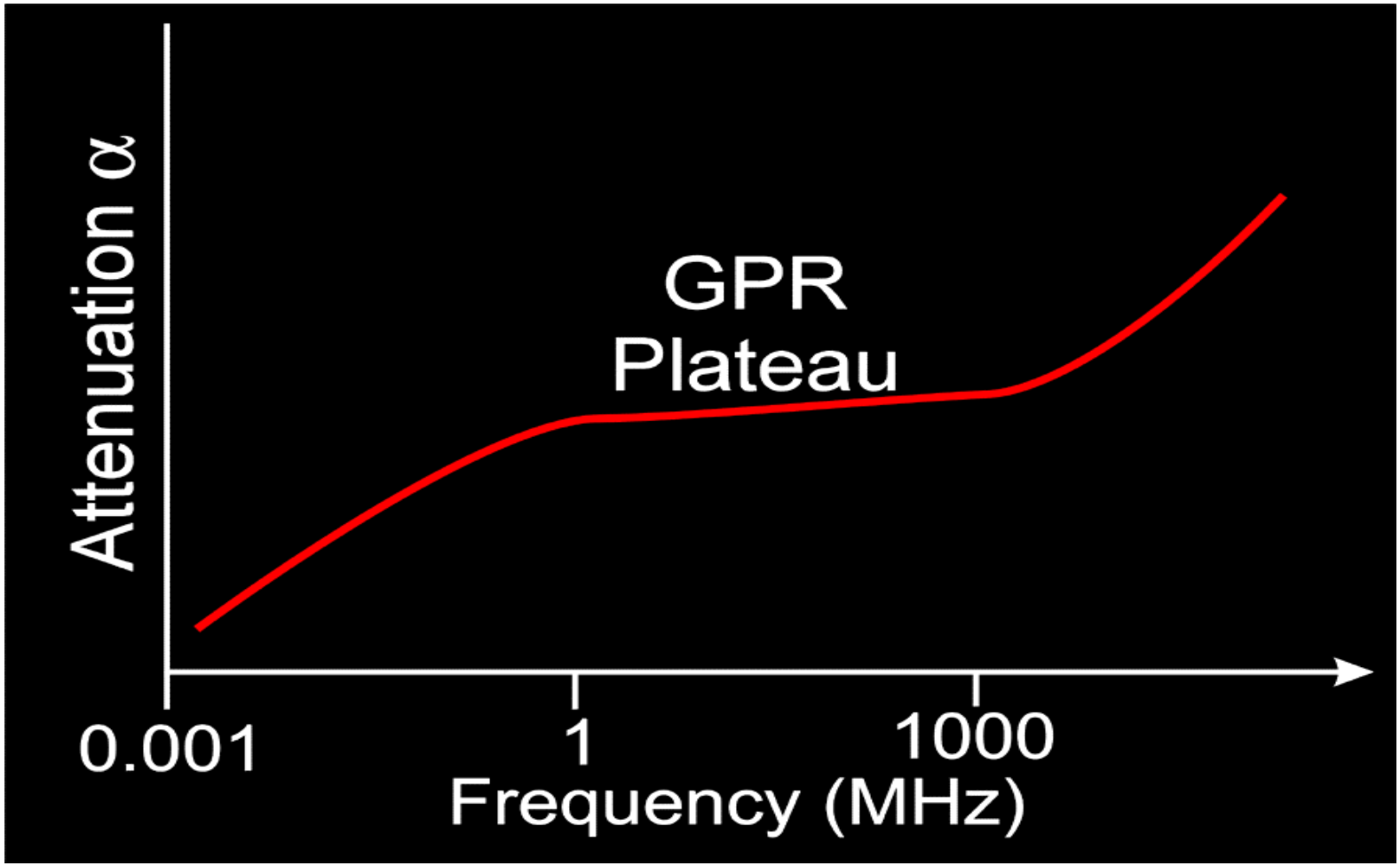


100 MHz wavelet

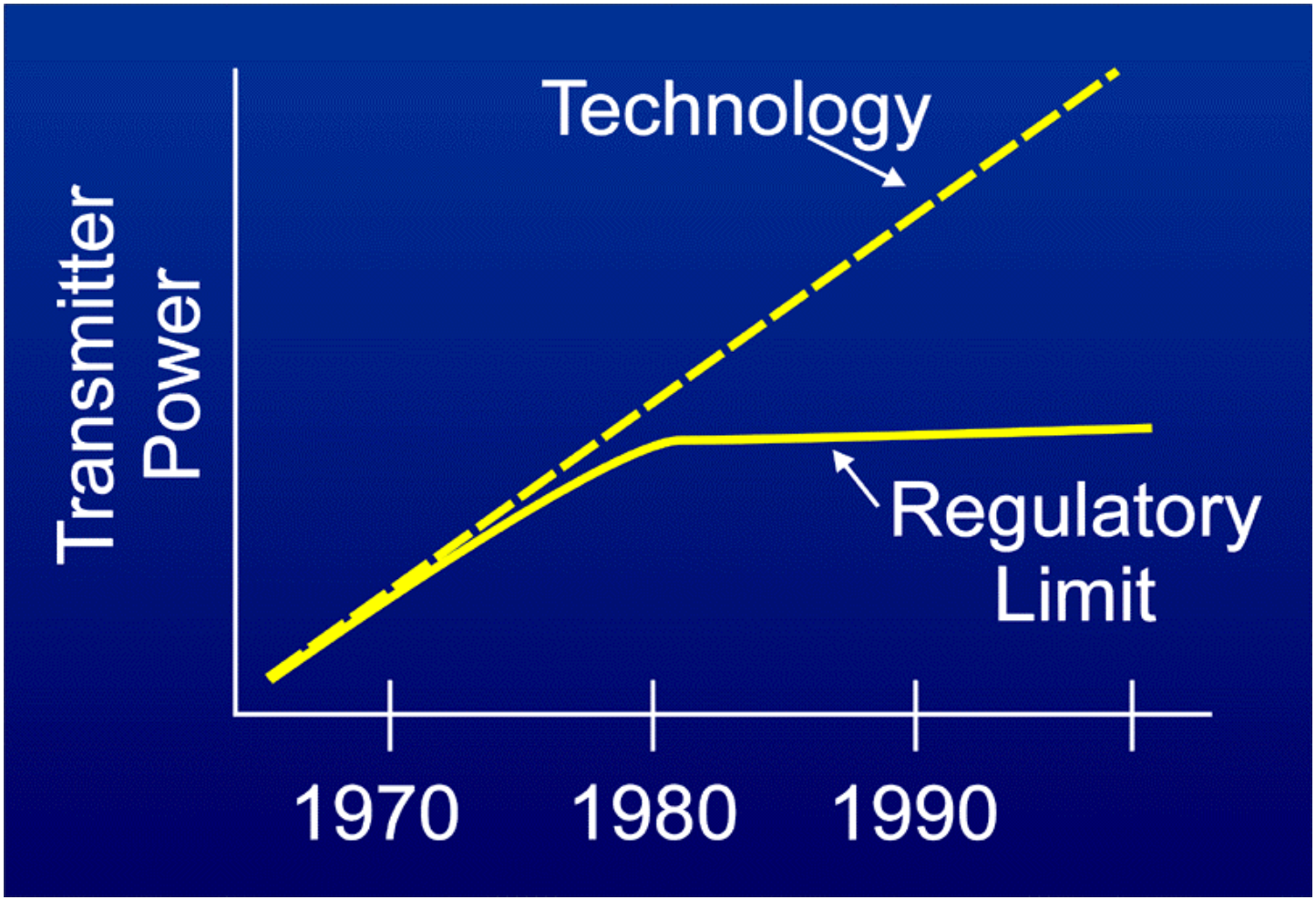
100 MHz wavelet spectrum



The reason why GPR is possible



GPR systems are normally designed to meet FCC part 15, EC emissions limits - transmitter powers do not approach technology limits



Suggested GPR Emissions Levels

Frequency MHz	Suggested E Field uV/m (RMS)	Part 15.209 E Field uV/m	Distance m
1.705-30	100	30	30
30-88	300	100	3
88-216	500	150	3
216-960	700	200	3
>960	1000	500	3

Rationale

- current GPRs will meet this spec (see test results in comment Sept 2001)
- current GPRs have extensive history with no interference
- values based on FCC part 15 Class A for digital devices
- energy primarily dissipated in ground
- lab results indicate essential computer control biggest emissions source - not GPR

Testing Procedures

- follow existing methods to minimize costs
- standard CISPR 16 as in Part 15 and EC emissions testing
- measure with GPR positioned as intended use
- place over a concrete slab as representative material (no rebar)

Peak to average field limit

= 10 log10 (pulse width * PRF) dB

or

= 60 dB

relative maximum ‘permitted’ average whichever is lower

Rationale: need to recognize that low frequency GPRs for deep geology need long time windows and have low PRF making a fixed limit onerous

Pulse Repetition Rate (PRF)

- limit to less than 500 kHz average over 1 second
- most GPRs operate with PRF in 10 to 500 kHz range
- these rates assure that GPR looks pulse-like to most devices
- electronic devices generally reject pulse-like transients

Non-proliferation comments

- GPRs are not marketed to consumers
- generally expensive & used by specialists
- used in remote areas/ construction sites, removed from victim receivers
- maximum numbers in a major city will never exceed 10’s to 100’s
- very low duty cycles - units off except when measuring & seldom used daily
- in 30 years no more than 1500 in USA

Requests for Rule Making

- allow unlicensed operation
- limit average (RMS) power to levels suggested herein
- make testing as simple and close to existing standards as suggested herein
- limit on pulse rep rate as suggested herein
- limit peak-to-average field values recognizing rep rate as suggested herein
- recognize that GPS and GPR co-locate and need one another
- user on-off control is standard; we suggest automated shut-off ability after a reasonable period
- note that proximity/orientation switches impractical